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Application No. 10/517,299

Filed: December 7, 2004

TC Art Unit: 2876

Confirmation No.: 4716

AMENDMENT TO THE CLAIMS

1. (Currently Amended) A system for product or document authentication, said system comprising:

\_\_\_\_\_a. one or more luminescent or fluorescent tags, said tags being applied to said product or document, wherein at least one of said tags is a mixture of more than one compound and wherein at least one of said tags is a mixture of a luminescent compound and a luminescence lifetime modifier;

b. an optical scanning component for detecting a signal emitted by said tag, ; and

c. an information technology component for analyzing said signal.

2. (Currently Amended) The system of claim 1 wherein at least one of said luminescent tags has an emitted signal of known time resolution.

3. (Currently Amended) The system of claim 2 wherein said known time resolution is the time ~~to~~ for decay of luminescence intensity of said at least one of said luminescent tags to a predetermined value.

4. (Cancelled)

5. (Original) The system of claim 2 wherein at least one of said tags is selected from the group consisting of dyes, inks and pigments.

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6. (Cancelled)

7. (Currently Amended) The system of claim ~~6~~1 wherein said luminescent compound is a lanthanide chelate.

8. (Original) The system of claim 2 wherein said known time resolution corresponds to an exponential, or sum of exponential, functions with decay constants ( $1/e$ ) that fall in the time window of 1 microsecond to 1 second.

9. (Currently Amended) The system of claim 1 wherein said tag has characteristics that can be detected as an image, a wavelength, a luminescence decay time or a combination thereof.

10. (Currently Amended) The system of claim 1 wherein ~~the substrate on which said tag is deposited is~~compatible with deposition on a substrate selected from the group consisting of paper, cloth, plastic, metal, leather, thread, metal or plastic foil, wrapping, coatings, films, holographic materials, label or card stock, printing inks, sprays, adhesives and glass.

11. (Currently Amended) The system of claim 1 wherein —at least one of said tags is invisible to the human eye.

12. (Currently Amended) The system of claim 1 wherein —one or more of said tags partially or completely overlaps another of said tags when applied to said product.

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13. (Original) The system of claim 1 wherein said information technology component is capable of resolving the signal detected by said optical scanning system into components, each of which can be further analyzed.

14. (Original) The system of claim 13 wherein said further analysis comprises identification of the spectral characteristics of said component as a function of time.

15. (Currently Amended) The ~~information technology components~~ system of claim 13 ~~in which~~ wherein said further analysis also includes the determination of whether said tag is authentic.

16. (Currently Amended) The system of claim 1 ~~in which~~ wherein said optical scanning component comprises a light source, ~~tag, and a scanner, and information technology system.~~

17. (Currently Amended) The system of claim 1 ~~in which~~ wherein said tags are applied at different times.

18. (Currently Amended) The system of claim 1 ~~in which~~ wherein said tags are applied at the same time.

19. (Original) The system of claim 1 comprising two or more luminescent or fluorescent tags, at least one of said tags being a mixture of a lanthanide chelate and a luminescence lifetime modifier.

20. (Original) The system of claim 1 comprising two or more tags.

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21. (Currently Amended) A system for product or document authentication, said system used to detect the presence of one or more luminescent or fluorescent dyes, wherein said dyes are applied to said product or document, wherein at least one of said tags is a mixture of more than one compound, wherein at least one of said tags is a mixture of a luminescent compound and a luminescence lifetime modifier, and wherein said system comprises:

- a. an optical scanning component for detecting signals emitted by said dyes, and
- b. an information technology component for analyzing said signals.

22. (Currently Amended) The system of claim 21, wherein at least one of said ~~tags~~ dyes is a mixture comprising a lanthanide chelate and a lifetime modifier selected from the group consisting of imidazoles, analogs of imidazole, derivatives of imidazole, phosphine oxide or pyridine oxides, polymers that provide coordination sites for metals, poly(vinyl acetate), poly(vinylpyrrolidinone), carboxylic acids, ketones, amides, alkene polymers, polyesters, and biopolymers.

23. (Currently Amended) The system of claim 21, wherein at least one of said ~~tags~~ dyes has an emitted signal of known wavelength band and known decay time.

24. (Currently Amended) The system of claim 1 wherein the said tag is applied to a substrate using a method of printing,

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including ink jet, continuous ink jet, thermal transfer, pad, offset, gravure, flexographic, or screen printing.

25. (Currently Amended) A method for authenticating a product or document, said method comprising:

a. labeling said product or document with one or more luminescent or fluorescent tags;

b. measuring the decay time of luminescence intensity of one or more signals emitted from one or more luminescent said tags using an optical scanning component, after said tags are illuminated with one or more appropriate energy sources; and

c. analyzing said signals using an information technology component; and

d. identifying from said decay time a specific said tag for authenticating said product or document.

26. (Original) The method of claim 25 in which at least one of said tags has an emitted signal of known time resolution.

27. (Original) The method of claim 25 in which the time for said tag to decay to a predetermined value is known.

28. (Original) The method of claim 25 in which at least one of said tags is invisible to the human eye.

29. (Currently Amended) A method for product or document authentication, said method being used to detect the presence of one or more luminescent or fluorescent dyes, wherein said dyes are

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applied to said product or document, and wherein said method comprises:

a. ~~using an optical scanning component for detecting the decay time of luminescence intensity of one or more signals emitted by said dyes using an optical scanning component, and;~~

b. ~~using an information technology component for analyzing said one or more signals using an information technology component; and~~

c. ~~identifying from said decay time a specific said dye for authenticating said product or document.~~

30. (Currently Amended) A method for product or document authentication, said method being used to detect the presence of two or more dyes used as tags for said product or document, the combination of said dyes yielding a unique identifier, wherein said method comprises:

a. treating said tagged samples by exposing them to elevated temperature, electromagnetic radiation, or washing with selected solvents;

b. ~~using an optical scanning component for detecting the decay time of luminescence intensity of said two or more dyes; dye luminescence, and~~

c. comparing said ~~dye luminescence~~ decay time detected ~~vs. versus~~ control samples treated by similar exposures to elevated temperature, electromagnetic radiation, or washing with selected solvents.

31. (Currently Amended) A ~~The~~ method of claim 30 in which at least one of the said tags is a lanthanide chelate, based on the

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~~lanthanide elements, including but not limited to, europium, terbium, samarium, gadolinium, neodymium, and ytterbium.~~

32. (Currently Amended) A ~~The~~ method of claim 30 in which at least one of the said tags is a near-infrared dye.

33. (Currently Amended) A ~~The~~ method of claim 30 in which the luminescence of dye tags is recorded using a spectrophotometer.

34. (Currently Amended) A ~~The~~ method of claim 30 in which the decay time of luminescence of dye tags is used to establish a comparison of treated and untreated samples.

35. (Currently Amended) A ~~The~~ method of claim 30 in which luminescence peak intensities for dye tags are used to establish a comparison of treated and untreated samples.

36. (Currently Amended) A ~~The~~ method of claim 30 in which the dye tagged samples are heated in a drying oven before spectral analysis at 50-250 C.

37. (Currently Amended) A ~~The~~ method of claim 30 in which dye tagged samples are irradiated before spectral analysis using lamps that include, ~~but are not limited to,~~ an element selected from the group consisting of xenon, halogen, ~~or~~ and mercury, or laser sources that include but are not limited to, selected from the group consisting of solid state, Nd/YAG, dye, ~~or~~ and nitrogen lasers.

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38. (Currently Amended) ~~A~~The method of claim 30 in which dye tagged samples are washed before spectral analysis with solvent.

39. (Currently Amended) The method of claim 38 wherein said solvent is selected from the group consisting of —acetone, tetrahydrofuran, chlorocarbon, ethyl acetate, toluene, dimethyl sulfoxide, dimethylformamide, water and mixtures thereof.

40-45. (Cancelled)

46. (Currently Amended) ~~A method for forensic analysis comprising the~~The method of claim 25, wherein said product or document is additionally treated with heat or light.

47. (Currently Amended) The system of claim 1 wherein the characteristics that can be modified in ~~each of said tags is~~are selected from the group consisting of (a) dye, pigment or ink, (b) size or shape, (c) position of one tag in relation to another, and (d) ability to change with time or when exposed to conditions such as heat, light or contact with a solvent.

48. (Original) The system of claim 16 wherein said optical scanning component utilizes photoexcitation created by one or more pulsed light sources.

49. (New) The method of claim 31, wherein the lanthanide element is selected from the group consisting of europium, terbium, samarium, gadolinium, neodymium and ytterbium.